LESSON 3

Objective

Find the circumference of a circle.

Common Core State Standards

- **7.G.4** Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Geometry

Circumference of a Circle and π

Students look at the ratio of circumference to diameter for various circles and develop both an approximation of the value of π and the formula for finding circumference. While a single circle shows the ratio, a larger number of examples helps students recognize the consistency of the ratio and provides a stronger basis for making a generalization.

Try It! *Perform the Try It! activity on the next page.*

Talk About It

Discuss the Try It! activity.

- **Ask:** *When might it be more useful to use $\frac{22}{7}$ as an approximation for π? When might it be more useful to use 3.14 for π?*
- **Ask:** *How would you find the circumference of a circle if you know its radius?* Explain that since the diameter is twice the length of the radius, the value $2r$ can be substituted for d in the formula for finding circumference: $C = \pi d = 2\pi r$.
- **Ask:** *How can you find the diameter of a circle if you know its circumference?*

Solve It

Reread the problem with students. Have students explain how to find the circumference of a circle when the diameter is known. Then have them find the length of ribbon Kaden needs to fit exactly around the top edge of the can.

More Ideas

For other ways to teach about circumference and π—

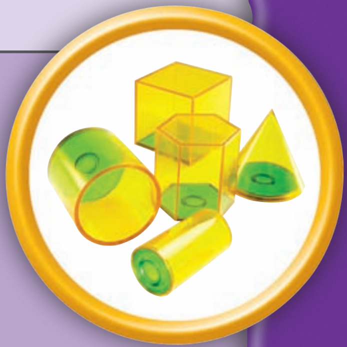
- Have students trace the inner and outer circles of the Rainbow Fraction Circle Rings and then measure the circumferences of the traced circles to develop the concept of π.
- Provide each group with a different circular object, such as a Two-Color Counter, spinner, Deluxe Rainbow Fraction® Circles, or Relational GeoSolids® cylinder. Have each group find the ratio of circumference to diameter of their object. Record results on the board and have students generalize the ratio—that is, determine π.

Formative Assessment

Have students try the following problem.

The diameter of a circle is 52 inches. Which expression can you evaluate to find the circumference?

A. $52 \div \pi$ **B.** $\pi \div 52$ **C.** $52 \times \pi$ **D.** $26 \times \pi$



Try It! 30 minutes | Groups of 4

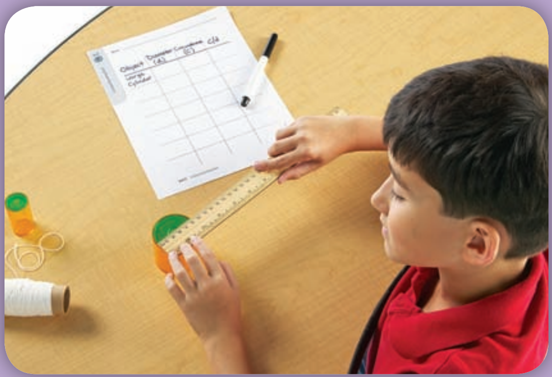
Here is a problem about finding the circumference of a circle.

Kaden is decorating a can for his mother to store her small crafts. He wants to glue a piece of ribbon to the top edge of the can so that it goes around the can exactly one time. How much ribbon does he need if the diameter of the can is 14 cm?

Introduce the problem. Then have students do the activity to solve the problem. Distribute the materials. Have students start a recording chart with these headings: *Object, Diameter (d), Circumference (C),* and $\frac{C}{d}$.

Materials

- Relational GeoSolids® large and small cylinder (1 set per group)
- other circular objects (optional)
- BLM 9
- paper (1 sheet per group)
- string (2 feet length per group)
- centimeter rulers (1 per group)
- calculators (1 per group)



1. Have students measure the diameter and circumference of the base of the large and small cylinders and record each measurement to the nearest tenth of a centimeter. Then have students divide to complete the chart.

2. Have students measure the diameter and circumference of other circular objects to the nearest tenth of a centimeter and complete the table. **Ask:** *What pattern do you see in the measurements?* Write the symbol π on the board. **Say:** *This symbol is called* pi. *We often use 3.14 or* $\frac{22}{7}$ *to approximate its value.*

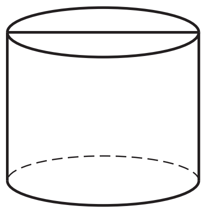
3. Ask: *How can you find the circumference of a circle if you know its diameter? What formula can you use?* Write $C = \pi \times d$ on the board. **Say:** *Add a circle with a diameter of 14 cm to your recording sheet. Use the formula to find the circumference.*

⚠ Look Out!

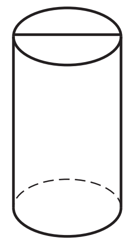
Be sure that students measure each diameter and circumference correctly. Remind them to measure the diameter at the widest part of the circle. This will help students calculate a more accurate number for π. Explain to students that π is the same for any circle, no matter how big or small. Students' calculations for π may differ slightly.

Use Relational GeoSolids to model each cylinder. Use a ruler to find the diameter of the base. Find the circumference of the base. Use 3.14 for π.

(Check students' work.)

1. 

Answers will vary depending on size of Relational GeoSolids available.

2. 

Answers will vary depending on size of Relational GeoSolids available.

Draw a circle that has each diameter. Find the circumference of the circle. Use 3.14 for π.

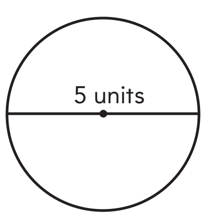
3. 3 inches

9.42 in.

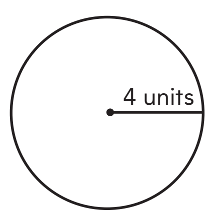
4. 11 centimeters

34.54 cm

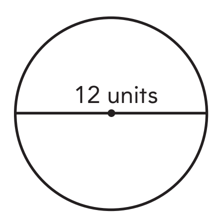
Find the circumference of each circle. Use 3.14 for π.

5. 

15.7 units

6. 

25.12 units

7. 

37.72 units

Answer Key

Challenge! Explain the meaning of π in terms of the parts of a circle. How is the circumference of a circle related to π?

Challenge: (Sample) The value of π is the ratio of any circle's circumference to the diameter of the circle.

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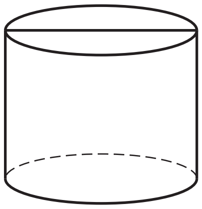
Use Relational GeoSolids to model each cylinder. Use a ruler to find the diameter of the base. Find the circumference of the base. Use 3.14 for π.

1. 

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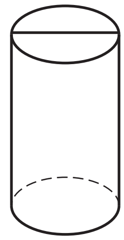
2. 

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Draw a circle that has each diameter. Find the circumference of the circle. Use 3.14 for π.

3. 3 inches

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4. 11 centimeters

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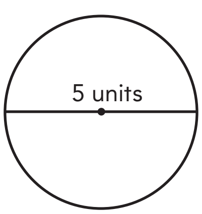
Find the circumference of each circle. Use 3.14 for π.

5. 

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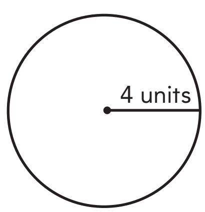
6. 

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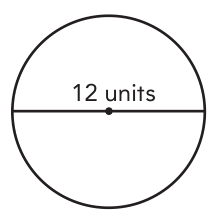
7. 

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Name ______________________________

Challenge! Explain the meaning of π in terms of the parts of a circle. How is the circumference of a circle related to π?

Name ______________________________
